

***Musa beccarii* (Musaceae) Varieties in Sabah, Northern Borneo**

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Musa beccarii Simmonds var. *beccarii* is re-described based on extensive field studies in the eastern part of Sabah, Malaysia. Then a new variety of wild banana, *M. beccarii* Simmonds var. *hottana* Häkkinen, is described and illustrated. This extremely rare new variety was only found in one area at the lower Kinanbatangan River, eastern part of Sabah. It is also considered that *M. pigmaea* M. Hotta nom. nud. from East Kalimantan, Indonesia, might be the synonym or a closely related variety to the new variety.

Key words: Borneo, *Callimusa*, *Musa*, *Musa beccarii*, *Musa beccarii* var. *beccarii*, *Musa beccarii* var. *hottana*, *Musa pigmaea*, wild bananas.

Simmonds, who never visited Borneo, originally described *Musa beccarii* from a cultivated plant in Trinidad, which he grew from seeds imported from Sabah. He quoted that “This interesting little plant recalls *Musa coccinea* Andrews in general appearance but is quite distinct from it in the deciduous basal bracts, the large green fruits, the long-lived male bud and, above all, in the seeds which are not of the barrel- or top-shaped type characteristic of section *Callimusa*. The chromosome number, $2n = 18$, is new to the genus *Musa*. In the herbarium the plant looks like section *Rhodochlamys* and I took it to be allied to *M. laterita* E. E. Cheesman when I first saw specimens in the Singapore collections” (Simmonds 1956), [(*M. coccinea*: Andrews 1894), (*Callimusa*: Cheesman 1947 and *M. laterita*: Cheesman 1949), (*Callimusa*: Häkkinen 2004a)].

Simmonds (1956) also added “The species grows well in Trinidad (which is rather unusual for bananas from Borneo) but sets fruit only sporadi-

cally. The description below is based on living plants grown in Trinidad, except for fruit characters, which are described from the Singapore specimens. So far as other characters can be determined in the herbarium, the Trinidad and Singapore plants agree well and there is no reasonable doubt that all the specimens cited represent but one species”.

The first author has also studied the Singapore herbarium collection and agrees with Simmonds’ observations. The first author has also written articles on the section *Rhodochlamys* (Häkkinen & Sharrock 2002) and of *Musa laterita* (Häkkinen 2001). *Musa beccarii* was treated as *incertae sedis* until Simmonds & Weatherup’s (1990) numerical taxonomic analysis of wild bananas placed it in section *Callimusa*.

This study was conducted during a supplementary study on wild bananas in Sabah in the spring of 2004 along the Telupid - Sandakan - Tawau range, comprising of morphological obser-

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TABLE 1. Differentiating characteristics of *Musa beccarii* varieties:

| Descriptor | <i>Musa beccarii</i> var. <i>beccarii</i> | <i>Musa beccarii</i> var. <i>hottana</i> |
|---|--|--|
| Leaf habit | Erect | Drooping |
| Suckers | Clumps, up to 12 suckers | Maximum 2 suckers |
| Pseudostem height | Up to 1.2 m. | Up to 0.8 m. |
| Pseudostem underlying colour | Light yellow | Medium green |
| Blotches at the petiole base | Sparse blotches | Without pigmentation |
| Petiole canal leaf | Margins erect or slightly curved inward | Margins overlapping |
| Petiole margin colour | Purple | Dark green |
| Colour of leaf upper surface | Bright -green | Green |
| Insertion point of leaf blades on petiole | Slightly asymmetric and rounded | Both sides pointed |
| Colour of midrib dorsal surface | Green | Light-green |
| Peduncle hairiness | Minutely hairy | Very hairy |
| Peduncle colour | Light-green | Purple |
| Bract base shape | Small shoulder | Large shoulder |
| Colour of the bract external face | Scarlet | Orange-red |
| Bract apex shape | Obtuse with green tips | Obtuse with yellow tips |
| Male bract lifting | Lifting one at time | Lifting two or more at a time |
| Compound tepal basic colour | Yellow-green | Light-green |
| Free tepal colour | Tinted with yellow | Translucent white |
| Anther colour | Yellow | Cream |
| Pollen sac colour | Cream | White |
| Style basic colour | Cream | White |
| Dominant colour of male flower | Cream | Light-green |
| Fruit position | Parallel to the stalk | Fingers curved upwards |
| Fruit shape (longitudinal) | Straight or slightly curved | Heavily thick in center |
| Immature fruit peel colour | Green | Light green |
| Pulp colour before maturity | White | Cream |
| Pulp colour at maturity | White | Cream |

vations based on living plants of *Musa* in the field by completing the entire INIBAP *Musa* Descriptor List (IPGRI-INIBAP/CIRAD 1996). Relevant parts of the specimens of var. *beccarii* and a holotype of var. *hottana* were deposited at the herbaria of the Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah (BORG). The complete descriptor lists are available at the University of Helsinki, Finland, as well as at the aforementioned center.

Musa beccarii* Simmonds var. *beccarii

Musa beccarii Simmonds, Kew Bull. 14(2): 200-201, 1960. *Type*: British North Borneo, Mile 18, Labuk road, 1956. G. H. S Wood s. n. (Holotype: K, isotype: BO, KYO, L, SAN, SING).

Plant suckering freely, clumping close to parent plant, up to 12 suckers, position vertical. Mature pseudostem slender up to 1.2 m high, sheaths bright green, underlying colour light yellow, devoid of wax, sap watery. **Petiole** up to 60 cm long, petiole canal margins erect or slightly curved inwards with narrow purple and scarious margins, winged and clasping the pseudostem. **Leaf** habit erect, lamina up to 120 cm long, 40 cm wide, oblong-lanceolate, obtuse, colour of upper surface bright green, lower surface medium green, appearance shiny, leaf bases slightly asymmetric and both sides rounded, with very corrugated lamina, midrib dorsally and ventrally green. **Inflorescence** small, erect, peduncle, 7 cm long, 2.5 cm in diameter, minutely hairy and light green in colour. **Female flowers** on basal 2 - 5

nodes, each bearing 1 - 3 uniserrate flowers, ovary 5 - 6 cm long, yellow, arrangement of ovules in two rows per loculus, compound tepal 3.5 cm long, free tepal 3 cm long, style 3.5 cm long. **Male bud** lanceolate, 12 cm long, 4 cm wide, bracts imbricate, apex obtuse, dorsally polished scarlet and greenish at the tip, ventrally scarlet and duller, lifting one bracts at a time, not revolute. **Male flowers**, 2 - 5 per bract, in one row, creamy, falling with the bract, compound tepal 4 cm long, yellow green below shading to green at the tip, ribbed at the dorsal angles, with 5 minute, mucronate teeth 1 - 2 mm

long, free tepal 2.5 cm long, broadest near the base, nearly plane, tapered to a blunt mucronate point, tinted with yellow, fertile stamens 5, filaments 1.8 cm long, anthers 2.2 cm, same level, yellow, sterile pistil inserted, style cream in colour, stigma cream, ovary 6 mm long straight, without pigmentation. **Fruit** bunch small, rather lax, erect, consisting of 2 - 5 hands of 1 - 3 fruits each, fruits parallel to the stalk, 11 cm long, 2.3 cm in diameter, strait or slightly curved, slightly ridged, apex blunt-tipped, pedicel 5 mm long, glabrous, immature fruit peel colour green, at maturity pale yellow. **Seeds**, cylin-

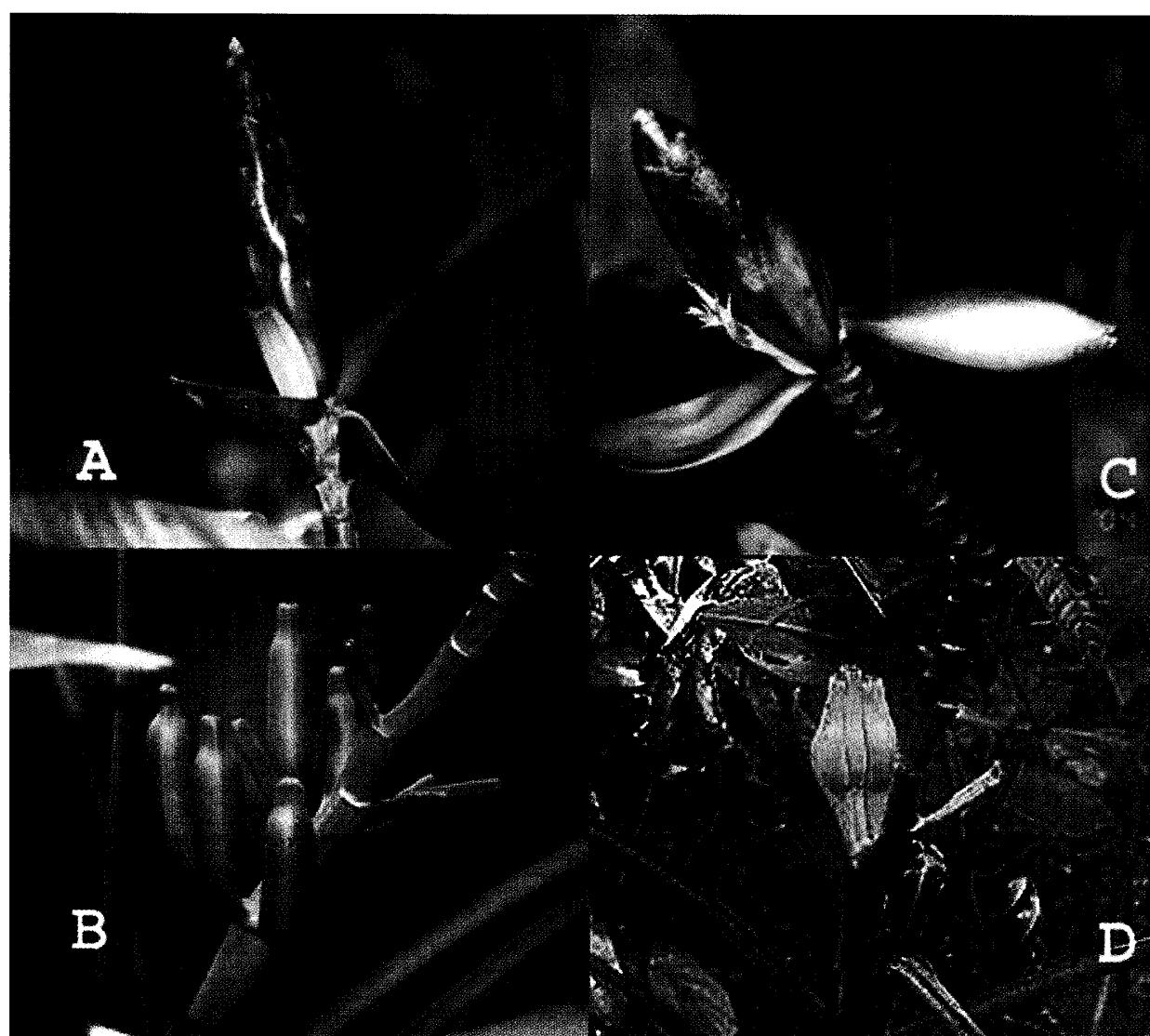


FIG. 1. Varieties of *Musa beccarii* Simmonds. A: Male bud of *M. beccarii* var. *beccarii*. B: Unripe fruit bunch of *M. beccarii* var. *beccarii*. C: Male bud of *M. beccarii* var. *hottiana*. D: Nearly mature fruit bunch of *M. beccarii* var. *hottiana*.

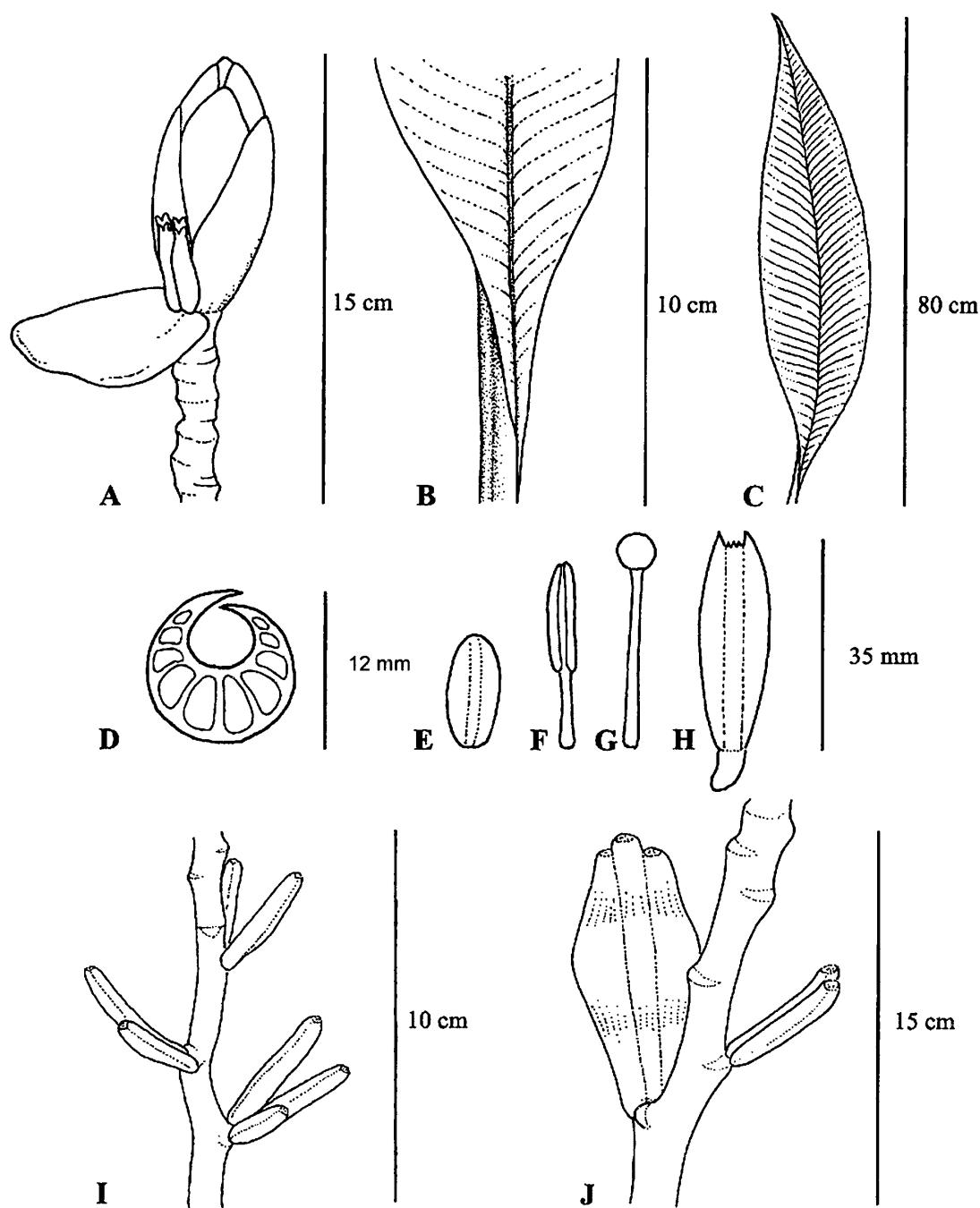


FIG. 2. *Musa beccarii* Simmonds var. *hottana* Häkkinen var. nov. A: Male bud. B: Leaf base and upper part of petiole. C: Leaf. D: Cross-section of petiole. E: Free tepal of male flower. F: Stamen of male flower. G: Pistil of male flower. H: Compound tepal of male flower. I: Ovaries of female flowers. J: Nearly mature fruit bunch.

drical, obpyriform, and wrinkled, tuberculate, 4 mm long. 70 - 80 per fruit. Chromosome number "2n = 18".

Vernacular name: Pisang tajak. Figs: 1A, 1B.

Specimen examined: MALAYSIA. Sabah.

Sandakan. Telupid. 162 ft. alt., latitude 05° 39.856' N., longitude 117° 13.503' E., May 22, 2004. *M. Häkkinen and J. Gisil.* 11, (BORG).

***Musa beccarii* Simmonds var. *hottana* Häkkinen var. nov., Figs. 1, 2.**

Plantae parvae surculis usque ad 2, non caespitosae, sub arboribus altioribus tantum crescentes; laminis viridibus sine cera, utroque latero aequali, ad basin cuneato; inflorescentia parva erecta pedunculo pubescentissimo pilis brevibus; fasciculis basalibus 2-3; gemma mascula ovoidea obtusa, bracteis imbricates superficie externa rubris interna aurantiaco-rubris apice flavis obtusis, duabus vel pluribus simul assurgentibus; fructuum racemo modice laxo, fasciculis 3 et fructibus plerumque 2-3 in quoque fasciculo, quoque fructu sursum extendente secus rhachim, 7 cm longo circiter 2 cm in diametro, valde incrassato in media parte, leviter porcata trigona, pedicello 2.3 cm longo, apice truncato in colum quasi lagenarium extende.

Type: MALAYSIA. Sabah, Sandakan, Kinabatangan River. 74 ft. alt., latitude 05° 30.749' N., longitude 118° 17.361' E., May 20, 2004. *M. Häkkinen & J. Gisil* 12. (Holotype, BORH), [*Musa pigmaea* M. Hotta, nom. nud. (Hotta 1989)].

Plant small, maximum 2 suckers, not clumping, close to parent plant, position vertical. Mature pseudostem slender up to 0.8 m high, sheaths green, underlying colour medium green, devoid of wax, sap watery. **Petiole** up to 45 cm long, petiole canal margins overlapping with narrow dark green scarious margins, winged and clasping pseudostem. **Leaf** habit drooping, lamina up to 80 cm long, 20 cm wide, lanceolate, colour of upper and lower surface green, appearance shiny, both sides of leaf bases pointed at the base (Figs. 2B, 2C). **Inflorescence** small, erect, peduncle 7 cm long, 1.5 cm in diameter, very hairy with short hairs and purple in colour. **Female flowers** on basal 2 - 3 nodes, each bearing 2 - 3 uniserrate flowers, ovary 2 - 3 cm long, light green, arrangement of ovules in two rows per loculus. **Male bud**, ovoid, 7 cm long, 3 cm wide, bracts imbricate, apex obtuse, dorsally red with discoloured stripes and yellow at the tip, ventrally orange red, moderately waxy, deflexed but not rolled back and lifting two or more bracts at

a time (Figs. 1C, 2A). **Male flowers**, 2 per bract, in one row, light green, falling with the bract, compound tepal 3.5 cm long, light-green in the upper part and yellow at the base, ribbed at the dorsal angles, with 5-toothed apex, the outer lobes ovate, cuspidate, inner three lobes rotundate, central one larger than the laterals, free tepal 2.0 cm long, translucent white, oblong, rotundate and simple folding under apex, near the base, tinged with green distally on the slender midrib, fertile stamens 5, filaments 0.8 cm long, anthers 2 cm long, sterile pistil inserted, style white in colour, stigma cream, ovary 5 mm long straight, without pigmentation (Figs. 2D-H). **Fruit** bunch small, rather lax, erect, consisting of 3 hands of 2-3 fruits each, fruits curved upwards to the stalk, 7 cm long, 2 cm in diameter, heavily thickened in center, slightly ridged with 3 angles, apex bottle-neck-shaped, pedicel 2.3 cm long, immature fruit peel light green, becoming cream yellow at maturity (Figs. 1D, 2I-J). **Seeds**, cylindrical, obovate, and wrinkled, tuberculate, 2 mm long. 20 - 30 per fruit. Chromosome numbers were not counted.

Vernacular name: Pisang hutan.

Notes: Hotta (1989) mentioned *Musa pigmaea* in reference to the herbarium samples collected by a Japanese botanist Mr. Murata near Samarinda, East Kalimantan in 1979 but he never described it thoroughly. He stated that "*Musa pigmaea* M. Hotta, nom. nud. (sp. nov.) is a new species closely related to *M. beccarii*". As a result of the observation on Hotta's voucher specimens, we concluded first that *M. pigmaea* might be the same as this new variety but no research was conducted in East Kalimantan in order to proof the synonymy.

The new variety is named in honour of Prof. Mitsuru Hotta, distinguished for his contributions to the botany of Borneo and for his excellent descriptions of wild bananas from that island.

Var. *beccarii* wild populations are still quite commonly seen despite massive land clearing for oil palm plantations in the area, which restrict the nat-

ural habitats enormously.

These two varieties evolved in different directions, as an adaptation of their growing conditions. Var. *beccarii* can only grow in open exposure. Under canopy it very soon shrivels and dies. Var. *hottana* is extremely rare and we found it in only one location in the lower Kinabatangan River region in Sabah. With contrary characteristics it can only grow under the canopy. It is also noted that those *Musa* species that grow under the canopy, *i.e.*, *M. beccarii* var. *hottana*, *M. azizii* Häkkinen and another undescribed species (Häkkinen 2004b) are the smallest ones in the genus.

Eventually, it is expected that *Musa beccarii* var. *hottana*, which is an extremely rare species, would become extinct due to massive land clearing for oil palm plantations in the eastern part of Sabah. However, the living plants have been collected and are now cultivated in the Universiti Malaysia Sabah for *ex-situ* conservation. *Musa beccarii* var. *beccarii* has already been disseminated all over the world as an ornamental cultivated plant for decades. It probably derived from the Trinidad collections, as were many other ornamental bananas in cultivation (Shepherd 1999).

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